

intervals varying from two to five minutes' duration, I counted six of these discharges, and following each discharge there came a gentle tremulous movement. Immediately after the last movement, heavy rain fell, and at 1.55 there were several flashes of very vivid lightning accompanied by loud peals of thunder. The rain continued to fall during all yesterday and last night.

Although Dominica is essentially of volcanic origin, and contains at the present day three active geysers, called respectively the Soufrière, the Walton Waven, and the Boiling Lake, no unusual quantity of sulphurous or mephitic vapours have lately been noticeable in the atmosphere; in fact, only one of the phenomena usually attending earthquakes preceded the shocks I have just described, and that was violent rain. The planters' "dry season" may be said to begin in January and to end in July, and during these months, harvesting, *i.e.*, sugar-making, goes on uninterruptedly. This year, however, there has been no "dry season," for 101.67 inches of rain have fallen on the east coast and 45.80 on the west coast of this island.

I may add, in conclusion, that being unwell and unable to sleep, I was reading by lamplight when the shocks above described took place, and that I timed them carefully with a chronometer-watch by Barraud and Lund, which was on a chair near my bed.

EDMUND WATT
Resident District Magistrate,
Leeward Islands

Dominica, British West Indies, August 11

Is it True that no Animal can be shown to have made Use of Antecedent Experience to intentionally improve upon the Past?

I HAD a pair of yellow African singing finches last year. The hen laid twenty-two eggs during the year, three at each nesting. In early spring I gave her materials to build with. She selected cotton wool and fine dryish grass for her purpose. It was very cold weather when she built her first nest in a little basket which I fixed high up in her cage.

The nest was a mere film of cotton wool lined with a few blades of grass. Of course the little creature could not sufficiently warm her eggs to hatch them, if they had proved fertile, which they did not.

At the end of fourteen days the cock, finding the eggs unhatched, set to work to bury them under cotton and grass (he being the only cock bird I had ever kept that built quite as well and as diligently as the hen did).

I then removed the eggs and the nest, and gave the birds fresh materials to build another nest with. They very soon accomplished this, making the nest of the same materials, but thicker and more compact than the last.

Again three white eggs were laid in it, but the hen could not get up the necessary degree of heat to hatch them, and at the end of fourteen days the cock set to work to build a third nest over them as before.

I again took away the nest and eggs, and I replaced the basket, this time covered externally with wadding and flannel, in hopes that thus I might help the hen to get up the proper temperature.

The little creatures immediately set to work to build again, but they this time built a much thicker and warmer and more compact nest than they had ever done before. The eggs proved fertile, and the process of incubation seemed to be successfully drawing to a close; but the patience of the cock did not suffice for the occasion. At the end of the tenth day he set to work to pull the cotton wool and grass about from the edges of the nest, and tried to bury the eggs as before, urging the hen to begin again also. This showed an unaccountable lack of instinct, not to say of reason; but surely the fact that the birds built each succeeding nest more and more thickly and warmly till incubation was possible indicates that they had made use of antecedent experience, and intentionally improved upon the past. These birds built a warm nest this spring, and succeeded in hatching a young one.

J. E. S.

Deltaic Growths

IN NATURE, vol. xix. p. 506, a Rangoon correspondent states that the Gulf of Martaban has shallowed 100 feet since the surveys of Captains Ross and Crawford, made probably thirty years ago. He is mistaken as to the date of these surveys for this reason:—

In 1822, at the outbreak of the first Burmese war, my father

was appointed Flag Captain to Commodore Sir John Hayes's squadron, and he subsequently received the thanks of the Indian Government for, among other services, his surveys and explorations of the enemy's coasts and rivers. Now the soundings in the gulf would be about the first made. Hence the date would be 1822, or fifty-seven years ago. This shows an average annual deposit of 1.8 foot, which, although very much less than what Mr. Doyle imagines, is yet almost incredible. May there not have been a gradual rising of the sea bottom to assist?

FRASER S. CRAWFORD

Adelaide, South Australia, July 16

Sphinx (*Deilephila*) Lineata

As this insect is "unquestionably rare in England," and not common anywhere ("*D. Daucus*, a native of North America, being placed for it"—according to Mr. Stephens—"in collections"), perhaps I may be allowed to mention that a beautiful and perfect specimen of it was secured in my garden, on the 15th inst., by my little son, William Cecil. He was attracted to its resting-place in a wigelia bush by the flight there of a common gamma, and to his credit, inclosed it gently in his hand without the slightest injury—a prize indeed for a collector eight years old!

A specimen was also sent my daughter some months ago, from Porto Fino on the Riviera di Levante, by Mr. Robert Macdonald, but it was unfortunately wrecked in the post.

Bregner, Bournemouth, August 18

HENRY CECIL

The Recent Hail-storm

I INCLOSE a tracing of a broken window-pane—one of the numerous cases of damage caused by the hail-storm on the morning of the 3rd inst. in this place. I almost fear the subject is one unworthy the attention of your readers, but I am curious to know what relation the space cut out may bear to the size of the hailstone causing it; and whether the clean and regular opening made would indicate an almost horizontal direction of the blow, as in the case of a bullet.

Observations of the extreme dimensions of the hailstones on that occasion are various among my neighbours, but one so large as 3½ inches seems incredible; and that one approaching such a size should strike a window at a right angle appears also improbable.

CHAS. FREDK. WHITE

42, Windsor Road, Ealing, August 20

OUR ASTRONOMICAL COLUMN

THE WASHINGTON CATALOGUE.—A second edition, as it is termed, of this extensive and useful work has been published, and will be found to be an even more important aid to the practical astronomer than the former one, which appeared as an appendix to the Washington volume for 1871, and to which reference has been made in this column as the "Washington General Catalogue." Like the first edition, it was prepared for publication by the late Prof. Yarnall, who died suddenly after a few hours' illness on February 27, having been an astronomer at the United States Naval Observatory for twenty-six years. In a note prefixed to this second edition, Admiral Rodgers, the present superintendent of the Observatory, handsomely acknowledges the extent and value of Prof. Yarnall's labours. A large majority of the observations upon which the catalogue is founded were made by him, as well as the computations, and the first printing of the work was executed under his immediate direction. It is stated that "the completed volume only reached him when he was already unconscious—an hour before his death. Astronomers will recognise in this volume not only a work of exceeding usefulness to them, but also a fitting memorial coming at the close of the long professional life of its author."

As was explained in the introduction to the former edition, the stars forming the catalogue consist mainly of stars used in observations with the zenith telescope, in the U.S. Army Surveys, in the lists of the Coast Survey, and many of Lacaille's stars mostly observed by Lacaille only. But there is a great addition of small stars, the

positions of which were required for the reduction of the observations made by the late Mr. James Ferguson during the years that he was so industriously and effectively observing with the equatorial. As a whole, therefore, the catalogue is a very miscellaneous one. The first edition contained 10,658 stars, with a number of cases, however, where the star had been observed only in one element, and included objects observed during the years 1845 to 1871. The new edition contains the results of observations to 1877, and includes 11,103 stars; the mean places are for the beginning of the year 1860, but it is to be borne in mind that they do not include any effect of proper motion from the mean date of observation, which is always given, to that general epoch. The annual precessions are annexed, without secular variation.

Like other publications of the U.S. National Observatory, the new Washington catalogue appears to have been most liberally circulated amongst astronomers.

NEW COMETS.—On August 21 a telescopic comet was discovered at Pola by Herr Palisa; its position at roh. 26m. M.T. was in right ascension $150^{\circ} 35'$ and declination $+49^{\circ} 6'$; daily motion in right ascension $1^{\circ} 34'$ increasing, and in declination 3 minutes diminishing; it was small but bright.

A second comet was discovered on August 24 at the Imperial Observatory, Strassburg, by Dr. Ernst Hartwig; it was then very faint and about $1\frac{1}{2}$ minutes in diameter. The following elements and ephemeris have been calculated by Dr. Hartwig, from the Strassburg observations on August 24 and 28, and one at Leipzig on August 26 :—

Perihelion passage August 26^h 46^m 1 M.T. at Berlin.

Longitude of perihelion	309 56 ^h 3	} M.Eq. 1879 ^o .
ascending node	28 12 ^h 7	
Inclination	71 55 ^o	
Logarithm of perihelion distance	9.99056	

Motion—retrograde.

It will be found that these elements have no resemblance to those of any comet at present in our catalogues.

The following positions are for Berlin midnight :—

	Right Ascension. h. m. s.	Declination North. ° ' "	Log. distance from Earth. ...	Log. distance from Sun. ...
Sept. 5 ...	13 34 9	42 50 ^h 3	0.1055	9.9973
9 ...	13 46 19	37 37 ^h 8	0.1314	0.0036
13 ...	13 55 44	32 57 ^h 2	0.1577	0.0116
17 ...	14 3 20	28 46 ^h 5	0.1834	0.0212
21 ...	14 9 38	25 2 ^h 6	0.2081	0.0320
25 ...	14 15 3	21 42 ^h 2	0.2315	0.0439
29 ...	14 19 47	18 41 ^h 8	0.2535	0.0567

TO ASTRONOMERS

THE United States Naval Observatory will gratefully receive for its Library *separate copies or reprints* of memoirs published in the Transactions of learned societies or in journals. The volumes of Transactions are regularly received, but often many months after the reprints of particular papers, which are, therefore, especially valued.

It is also requested that all communications of this nature, and all correspondence relating to them, may be addressed to The Library, U.S. Naval Observatory, Washington, U.S.A.

Agents of the Smithsonian Institution abroad will receive large parcels for transmission. Smaller ones will be received more quickly if they are sent by post.

As far as possible the publications of the Observatory will be distributed to all working astronomers.

JOHN RODGERS,

Rear Admiral, U.S.N., Superintendent
Naval Observatory, Washington, D.C., August 18

GEOGRAPHICAL NOTES

THE Permanent Commission of the International Geodetic Association, presided over by General Ibañez, has

decided to meet on the 16th inst. at Geneva, on the invitation which has been addressed to it by the Government of the little republic. The first official sitting is to be at 2 o'clock, on the 16th, at the Hotel de Ville of Geneva, in the room known as "the Alabama." In the evening Prof. E. Plantamour will hold a reception. The official sittings will continue daily at 10 A.M., in the same room, to the end of the week, interrupted on the 18th by a procession of steamers on the lake, which will occupy the whole of the day. On the evening of the 17th the Commissioners are invited to dine by the Council of the State of Geneva, and on the afternoon of the 19th there will be a reception at Sécheron by Prof. Plantamour. The programme of the session comprises: The reports of the Permanent Commission and the Central Bureau, the report of the Commission appointed at Hamburg in 1877 to consider the proposals of Lieut.-Col. Adan; the choice of the place of meeting of the sixth conference, and the appointment of special reporters to record the proceedings (1) As to determinations of latitude, longitude, and azimuth; (2) Triangulations and calculations of compensation of the networks; (3) Levelling operations and result of mareographic operations; (4) Measurements of the intensity of gravitation; (5) Publications relating to the measurement of degrees in Europe.

THE eminent African traveller, Dr. Junker, intends to start for Africa during this month. His first object is to reach Monbutta, which is to form the basis for his further investigations.

THE *Daily News* Lisbon correspondent telegraphs on September 2, that official news has arrived which states that on July 24 the explorers Ivens and Capello were in the district called Duque de Braganza. At the last session of the Geographical Society it was stated that the explorers were unable to continue their journey through want of means. The president promised to ask the Government to send them assistance. It will be remembered that Ivens and Capello started with Major Pinto.

WE find in the *Isvestia* of the Russian Geographical Society an interesting note by M. Potanin on the eastern Altai Mountains. Until 1869 these highlands were quite unknown, and even after the recent explorations of MM. Matusovsky and Sosnovsky it was considered that the Altai range did not go east of the meridian of Kobdo, where geographers, according to the map of Klaproth, supposed the existence of low hills which connected the Altai with the Tian Shan. Now M. Potanin proves that the Altai range goes further east, at least to the meridian of Lake Orok-nor, and that it is separated on its whole length by the Gobi steppe from the Tian Shan mountains. The altitude of the mountain passes in the parts visited by M. Potanin reaches as much as 8,000 feet. The eastern parts of the Altai mountains are rather dry, and forests in this part of the range are rather scarce.

THE same number of the *Isvestia* of the Russian Geographical Society contains an interesting note on the levelling accomplished during the last three years by the Russian General Staff on several lines of railways in Western Russia. The results are very satisfactory, as the probable error of this topographical levelling (with level and rule) does not exceed ± 2 inches on a distance of 100 versts (67 miles), *i.e.*, less than half the probable error of the best geodetical levellings. These levellings have brought to light a very interesting circumstance, namely, that the average level of the sea at Cronstadt is $13\frac{1}{2} \pm 3\frac{1}{3}$ inches higher than at Dünamünde; the distance between the two towns being 240 miles. The Prussian levellings prove that the level of the Baltic is 20 inches higher at Kiel than at Memel.

CAPT. HOWGATE writes to us that he is preparing to send an expedition to the North Pole next year, independently of